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Shane P. Coleman

Name

Shane P. Coleman

Signature

SPECIFICATION

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT We, John P. Maguire, a Citizen of the United States and a resident of Missoula, Montana, and Paul H. Greenwood, a Citizen of the United States and a resident of Missoula, Montana, have invented certain new and useful improvements in a

COMPRESSION ANCHOR

of which the following is a specification.

COMPRESSION ANCHOR

FIELD OF INVENTION

The present invention relates generally to an anchor for supporting a swimming pool accessory, such as a handrail, chair, platform, or diving board. More particularly, it relates to a corrosion-resistant compression anchor.

BACKGROUND

In the field of handrails and support accessories, such as swimming pool accessories, it is desirable to anchor supports, such as handrails, chairs, lifeguard platforms, diving boards and platforms, and starting platforms, into a ground surface, such as a pool deck. A typical handrail or support is cylindrical, approximately 1.9 inches in diameter. Various means are known for anchoring such supports into a pool deck or other ground surface. One such means is the use of a metal anchor that is embedded in the ground surface, for example, by installing the anchor during the construction of the pool deck by pouring the concrete or other pool surface around the anchor. Anchors receive the support member and hold it in place. Existing compression anchors, for example, utilize a compression ring that wraps around the cylindrical support when the support member is received in a cylindrical cavity of the anchor. The compression ring can be tightened to hold the support member in place and can be loosened to release the support member.

The use of existing anchors in a wet environment, such as around a swimming pool, poses particular problems. Because the water corrodes many metal materials, hand rails and other supports use stainless steel to present a clean, rust-free appearance. Conventional compression anchors, however, are formed from bronze or other material that tarnishes. When two pieces of stainless steel are pressed tightly together, a

permanent bond may be formed. In the case of a support member and an anchor, this is undesirable because one purpose of the anchor is to allow the support structure to be removed from the anchor; if a permanent connection was intended, the support structure would be permanently mounted in the ground surface during construction and there would be no reason to use an anchor. As a result, existing anchors are formed from metal other than stainless steel, such as bronze.

One problem with the use of bronze and other materials is that they tarnish in a wet or damp environment. As a result, existing anchor systems include a stainless steel escutcheon plate that wraps around the support and covers the exposed portion of the anchor. The escutcheon plate is undesirable in many applications because it rises above the ground surface and because it is another piece of construction material that must be purchased and installed. What is needed is an improved compression anchor.

SUMMARY

A compression anchor for holding a support member, such as a cylindrical handrail, is disclosed. The anchor includes a body having a cavity and a wedge portion that connects to the body using thick threads, such as 2-4 ACME-2G threads. The wedge is substantially cylindrical and encircles a support member received in the cavity. A compression ring is in contact with the body and the wedge portion. As the wedge portion turns relative to the body using the threads, the compression ring expands and contracts to loosen or tighten the connection between the received support member and the anchor. The wedge portion and the body are corrosion resistant.

An anchor is also disclosed for supporting a cylindrical support member. The anchor includes means for receiving the support member and means for releasably securing the support member in the anchor by compressing a compression ring around

the support member in response to a torsional force exerted on the means for receiving. The anchor also includes means for preventing the anchor from moving relative to a ground surface in which the support member is positioned, in response to the torsional force.

An anchor is also disclosed having a body and a wedge portion. The body defines a cylindrical cavity having a length in the range of 4-6 inches. The wedge portion connects to the body and includes an upper surface having a plurality of holes defined therein. The holes receive complementary pins on a key that is used to rotate the wedge portion relative to the body. The wedge portion encircles a support member received in the cavity. The upper surface of the wedge portion is substantially flush with an upper end of the body when the support member is received and secured in the cavity.

A key for adjusting a compression anchor is also disclosed having a handle and an engagement portion. The handle has first, second, and third elongated portions, each having first and second ends. The second portion is disposed between and connected to the first and third portions such that the first end of the second portion is connected to the first end of the first portion and the second end of the second portion is connected to the second first end of the third portion. The first and third portions are substantially parallel and the second portion forms an angle relative to the first and third portions. The engagement portion is connected to the second end of the third portion of the handle. The engagement portion includes first and second curved extension portions that form a semicircle that wraps around a cylindrical support member received in the anchor. A plurality of pins are connected to the engagement portion and extend outward therefrom,

in a direction generally normal to a plane containing the first and third portions of the handle.

SUMMARY OF DRAWINGS

The detailed description will refer to the following drawings, wherein like numerals refer to like elements, and wherein:

Figure 1 shows a compression anchor adapted to hold a support such as a cylindrical handrail for use in connection with a swimming pool;

Figure 2 shows a side view of the anchor shown in Figure 1;

Figure 3 shows a top view of the compression anchor;

Figure 4 shows a cross-section of the wedge anchor shown in Figure 3, taken along the line 4-4';

Figure 5 shows an enlarged view of the cross-section of the upper portion of the anchor identified in Figure 4 by the area 5-5';

Figure 6 shows a top view of the anchor body, with the wedge portion;

Figure 7 shows a cross-section view of the body portion shown in Figure 6 taken along the line 7-7';

Figure 8 shows a top view of the body of the anchor;

Figure 10 shows an enlarged view of the cross-section shown in Figure 9, identified by the encircled area 10-10';

Figure 11 shows a top view of the wedge portion of the anchor;

Figure 12 shows a cross-section of the wedge portion shown in Figure 11, taken along the line 12-12';

Figure 13 shows a side view of the wedge portion;

Figure 14 shows a compression ring;

Figure 15 shows a cross-section of the compression ring 3 shown in Figure 14, taken along the line 15-15';

Figure 16 shows a top view of a base plate next to a lower of the body of the anchor;

Figure 17 shows a side view of the plate;

Figure 18 shows a perspective view of another embodiment of the anchor with an anti-rotation tab positioned approximately midway along the length of the body;

Figure 19 shows a side view of the anchor shown in Figure 18;

Figure 20 shows a perspective view of the anchor shown in Figure 18, including a portion of a support member positioned in the anchor;

Figure 22 shows a top view of the anchor and support member shown in Figures 20 and 22;

Figure 23 shows a cross-section of the anchor and support member shown in Figure 22, taken along the line 23-23';

Figure 24 shows a more detailed view of the chamfered bottom corner shown in Figure 23;

Figure 25 shows a more detailed view of one of the spacers that extends into the cylindrical cavity and abuts the support member;

Figure 26 shows a bottom view of a key used to rotate the wedge portion relative to the body of the anchor; and

Figure 27 shows a side view of the key shown in Figure 26.

DETAILED DESCRIPTION

Figure 1 shows a compression anchor 10 adapted to hold a support member such as a cylindrical handrail for use in connection with a swimming pool. The anchor 10

includes a body 1 having an upper end 12 and a lower end 11. The lower end 11 is connected to a bottom plate 4. The base plate 4 also includes an electrical grounding connection 5, such as a screw. The upper end 12 of the body 1 is connected to a rim 8. The upper end 12 of the body 1 is wider in diameter than the rest of the body 1, as the body 1 tapers at a tapered portion 7 outward. An anti-rotation tab 6 is connected to the anchor body 1 to provide stability to the anchor body 1 and to prevent the anchor body 1 from rotating relative to the ground surface when the wedge portion 2 is turned to tighten and loosen the wedge 2, as described herein. In one embodiment, the anti-rotation tab 6 is substantially flat and extends outward from the body 1.

The upper surface 9 of the rim 8 of the anchor body 1 is substantially flat. In one embodiment, the anchor 10 is fixedly connected to a ground surface, and the upper surface 9 of the rim 8 is positioned substantially flush with the surface, such as a pool deck. The compression anchor 10 defines a cylindrical cavity 20 for receiving a support (not shown).

In use, the wedge portion 2 connects to the body 1 via threads. The wedge portion 2 is tightened or loosened to connect or disconnect a support member (not shown) received in the cylindrical cavity 20. A compression ring (not shown) is disposed inside the cylindrical cavity 20. As the wedge portion 2 is tightened relative to the body 1, the wedge portion 2 moves downward in the embodiment shown in Figure 1, thereby compressing the compression spring (not shown) against an interior wall of the tapered portion 7 of the anchor body 1. The wedge portion 2 includes an upper surface 21 that is substantially flat. In one embodiment, the upper surface 21 is substantially flush with the upper surface 9 of the anchor body 1 when the support (not shown) is tightened into

place. The wedge portion 2 also includes holes 22 defined in the upper surface 21. The holes 22 receive a key (not shown) that is used to tighten and loosen the wedge portion 2 relative to the body 1 of the anchor 10.

Figure 2 shows a side view of the anchor 10 shown in Figure 1, including the interior walls and structures of the anchor 10 shown in phantom lines. In the example of Figure 2, the bottom plate 4 includes a hole 24 defined therein. The hole 24 is generally aligned with a central axis of the wedge body 1, in communication with the cylindrical cavity 20. The wedge portion 2 is connected to the inside of the body 1 via threads 30. As shown in Figure 2, the compression ring 3 in positioned inside the cylindrical cavity 20 at the tapered portion 7 of the body 1. As the wedge portion 2 is tightened downward into position, the compression ring 3 compresses, thereby engaging a support member that is received in the cylindrical cavity 20. In the example of Figure 2, the wedge portion 2 has been tightened into position and the upper surface 9 of the rim 8 of the anchor body 1 is substantially flush with the upper surface 21 of the wedge portion 2.

Figure 3 shows a top view of the compression anchor 10. In the example of Figure 3, the hole 24 in the bottom of the base plate 4 is generally concentric with a longitudinal axis of the cylindrical cavity 20. Due to the shape of the bottom plate 4 in the example of Figure 3, portions of the bottom plate 4 extend into view at the left side of Figure 3. The top surface 21 of the wedge portion 2 includes four holes 22 in the example of Figure 3. The holes 22 may be used in connection with a key (not shown) to engage and disengage the wedge portion 2 with the body 1 of the compression anchor 10.

Figure 4 shows a cross-section of the wedge anchor 10 shown in Figure 3, taken along the line 4-4'. As shown in Figure 4, the compression ring 3 is a generally

cylindrical ring formed, for example, from metal that is positioned at the inner side of the tapered portion 7 of the anchor body 1. An example of Figure 4 the wedge portion 2 has completely engaged the anchor body 1 using the threads 30. The wedge portion 2 is turned into position such that the upper surface 21 of the wedge portion 2 is substantially flush with the top surface 9 of the rim 8 of the anchor body 1, in this example.

Figure 5 shows an enlarged view of the cross-section of the upper portion of the anchor 10 identified in Figure 4 by the area 5-5'. As illustrated in Figure 5, the rim 8 of the body 1 includes an inner sidewall 15. The inner sidewall 15 is spaced from the outer wall 29 of the wedge portion 2. The rim 8 also include an inner horizontal surface 13 which is spaced from a lower surface 23 of the wedge portion 2 when the wedge portion engages the threads of the body 1. In the example of Figure 5, the lower side 23 of the wedge portion 2 is spaced from the inner horizontal surface 13 of the body 1 by a distance A. In one embodiment, the distance A is in the range of .01 to .10 inches. In one particular embodiment, the distance A is .040 inches.

Figure 6 shows a top view of the anchor body 1, with the wedge portion (2 in Figure 1). As shown, the body 1 includes an upper side 9 of the rim 8. The rim 8 also includes an inner sidewall 15 and an inner horizontal surface 13. Threads 14 are used to engage the wedge portion (2 in Figure 1).

Figure 7 shows a cross-section view of the body portion 1 shown in Figure 6 taken along the line 7-7'. In the example of Figure 7, the inner diameter between the inner walls 15 of the rim 8 of the body 1 is shown by the distance G. In one embodiment, G is in the range of 2.5 to 2.6 inches. In one particular embodiment, the distance G is 2.565 inches, plus or minus .005 inches of tolerance. The height of the rim 8 from the

inner horizontal surface 13 to the top surface 9 is given by the distance H. In one example, H is in the range of .3 inches .4 inches. In one particular embodiment, the distance H is approximately .352 inches. The distance from the top surface 9 of the rim 8 to the lower most thread 14 is given by the distance I. In one embodiment, the distance I is in the range of 1.0 inches to 1.2 inches. In one particular embodiment, the distance I is approximately 1.102 inches. The distance from the top surface 9 of the rim 8 to the lower end of the inside of the tapered portion 7 is given by the distance J. In one embodiment, the distance J is in the range of 1.000 to 2.000 inches. In one particular embodiment, the distance J is approximately 1.561 inches. The distance from the top surface 9 to the bottom of the tapered portion 7 measured on the outside of the body 1 is given by the distance K. In one embodiment, the distance K is approximately 1.801 inches. In the example of Figure 7, the tapered portion 7 tapers relative to the rest of the body 1 by an angle L-degrees. In one embodiment, the angle L-degrees is in the range of 10 degrees to 30 degrees. In one particular embodiment, the angle L is approximately 20 degrees. The inner diameter of the cylindrical cavity 20 is given by the distance B.

In one embodiment, the anchor 10 is used to support a 1.5 inch handrail used in connection with a swimming pool or pool deck area. In this example, the distance B is in the range of 1.500 to 1.600 inches. In one particular embodiment, the diameter B is 1.515 to 1.520 inches. The outside diameter of the body 1 is shown by the distance C in the example of Figure 7. In one example, the distance C is in the range of 1.900 to 2.000 inches. In one particular embodiment, the distance C is approximately 1.940 inches. The outer diameter of the upper portion 12 of the body 1 is shown by the distance D in the example of Figure 7. In one example, the distance D is in the range of 2.250 to 2.500

inches. In one particular embodiment, the distance D is approximately 2.377 inches. The outer diameter of the rim 8 is shown as the distance E in the example of Figure 7. In one example, the distance E is in the range of 2.750 to 3.250 inches. In one particular embodiment, the distance E is approximately 3 inches.

Figure 8 shows a top view of the body 1 of the anchor 10. Figure 9 shows a cross-section of the body 1 shown in Figure 8, taken along the line 9-9'. As shown in Figure 9, the body 1 includes the cylindrical cavity 20. Threads 14 are formed in the upper portion 12 of the body. A tapered portion 7 tapers such that the upper portion 12 has a diameter that is wider then the lower portion 11 of the body 1. The rim 8 of the body 1 includes an upper surface 9, and inner surface 15, and an inter horizontal surface 13.

Figure 10 shows an enlarged view of the cross-section portion shown in Figure 9, identified by the encircled area 10-10'. As shown in Figure 10, threads 14 are defined in the upper portion 12 of the body 1. In the example of Figure 10, the length of the threads is given by the distance N. In one embodiment, the distance N is in the range of .5 to 1.0 inches. In one particular embodiment, the distance N is .75 inches. The distance from the top surface 9 of the rim 8 to the bottom of the threads 14 is shown by the distance M in the example of Figure 10. In one embodiment, the distance M is in the range of 1.0 to 1.5 inches. In one particular embodiment, the distance M is approximately 1.23 inches.

Figure 11 shows a top view of the wedge portion 2 of the anchor 10. The wedge portion 2 includes an upper surface 21 having defined therein four holes 22. The holes 22 are generally spaced evenly along the circumference of the upper surface 21 in this example. The wedge portion 2 defines an interior cavity 25. In use, the interior cavity 25

of the wedge portion 2 generally aligns with the cylindrical cavity 20 of the anchor body 1, and the support member passes through.

Figure 12 shows a cross-section of the wedge portion 2 shown in Figure 11, taken along the line 12-12'. The upper portion of the wedge portion 2 extends outward and has an outer side 29. A sidewall 32 defines the interior cavity 25 of the wedge portion 2. In the example of Figure 12, the holes 22 extend through the upper portion from the upper surface 21 to the bottom surface 23 of the wedge portion 2. Corners 26, 27, 28 of the wedge portion 2 are chamfered in this example. In the example of Figure 12, the threads 30 of the wedge portion 2 extend a distance T along the sidewall 32. The distance from the upper surface 21 to lower surface 23 is given by S in the example of Figure 12. In one example, the distance S is in the range of .30 to .325 inches. In one particular embodiment, the distance S is approximately .132 inches. The inner diameter of the cavity 25 of the wedge portion 2 is approximately the same diameter as the inner diameter of the cylindrical cavity 20 of the body 1 shown in Figure 7. The inner diameter P is approximately 1.515 to 1.520 inches in 1 embodiment period. The outer diameter of the threads 30 is given by the distance Q in the example of Figure 12. In one example, the distance Q is in the range of 1.988-2.000 inches. In one particular example, the distance Q is approximately 1.994 inches. The outer diameter of the upper portion of the wedge portion 2 is given by the distance R in the example of Figure 12. In one example, the distance R is approximately 2.5 inches.

Figure 13 shows a side view of the wedge portion 2. As shown in Figure 13, the upper portion includes an outer sidewall 29 that generally runs around the outside of the wedge portion 2. The outer side 29 has a chamfered corner 27. Similarly, the lower end

of the wedge portion 2 shown in Figure 13 shows a chamfered corner 28. Threads 30 extend outward from the sidewall 32 and are adapted to engage similar threads inside the body portion (14 in Figure 9). In one example, the threads are 2-4 acme-2G threads. The initial thread and the final thread may be trimmed to have a thickness of .03 inches in one example. In one example, the body 1 and the edge portion 2 of the anchor 10 are both formed from a stainless steel. In this example, the use of the acme threads has been shown to prevent the threads 30 on the wedge portion 2 from seizing with threads 14 on the body 1, as may otherwise occur with stainless steel connections using different types of threads.

Figure 14 shows a compression ring 3. The compression ring 3 has first and second ends 33, 34 separated by a distance U when the ring 3 is at rest (i.e., when no force is exerted compressing the ring 3). In one example, the distance U is in the range of .25 to .75 inches. In one particular embodiment, the distance U is approximately .409 inches. The ends 33, 34 may be cut substantially perpendicular to the ends of the ring 3. An angle V is formed between the sides of the ends 33, 34. In one example, the angle V is in the range of 20 to 40 degrees. In one particular embodiment, the angle V is approximately 30 degrees.

Figure 15 shows a cross-section of the compression ring 3 shown in Figure 14, taken along the line 15-15'. As shown in Figure 15, the ring 3 has a diameter W. In one example, the diameter W is in the range of 1.5 to 2.0 inches. In one particular embodiment, the distance W is approximately 1.776 inches. The ring 3 is formed from a stainless steel spring wire. In one example, the wire has an outside diameter of approximately .0915 inches and is a type 316 spring stainless steel wire.

Figure 16 shows a top view of a bottom plate 4 next to a lower end 11 of the body 1 of the anchor 10. The bottom plate 4 has a hole 24 defined therein. In use, the hole 24 is generally in communication with, and may be aligned concentric with, the cylindrical cavity 20 of the body 1. The bottom plate 4 also defines a hole 35 for receiving a grounding screw (5 in Figure 1). The hole 35 may be tapped for this purpose. In the example of Figure 16, various dimensions of the bottom plate 4 are illustrated. The bottom plate 4 has widths X and Y. In one example, the width X is approximately 2.5 inches and the width Y is approximately 2.75 inches. The center of the hole 24 is spaced from one side by a distance Z and by another side by the distance AA. In one example, the distances Z and AA are both 1.25 inches. The center of the hole 24 is spaced by a distance BB from the center of the hole 35. In one example, the distance BB is approximately 1.25 inches. The center of the hole 35 is spaced from the other side of the bottom plate 4 by a distance CC. In one example, the distance CC is approximately .25 inches.

Figure 17 shows a side view of the bottom plate 4. As shown in Figure 17, the bottom plate 4 has a width given by the letters DD. In one example, the thickness DD is approximately .10 inches.

Figure 18 shows a perspective view of another embodiment of the anchor 10 with an anti-rotation tab 50 positioned approximately midway along the length of the body 1. In use, the anchor 10 is embedded into a ground surface, or other surface, for example by pouring concrete or other foundation substrate around the anchor 10. To move the wedge portion 2 relative to the body 1, a user exerts a torsional force about a longitudinal axis of the anchor 10 using a key (not shown). The anti-rotation tab 50 is a flange that extends

outward from the anchor body 1. prevents the anchor 10 from rotating relative to the ground, or other surface, in response to the torsional force. In the example of Figure 18, the grounding screw 5 is connected to the anti-rotation tab. Also in this example, the bottom plate (not shown in Figure 18) is round and does not extend beyond the walls of the body 1.

Figure 19 shows a side view of the anchor 10 shown in Figure 18. As shown, the anti-rotation tab 50 extends outward from the body 1 of the anchor 10, and the grounding screw is connected to the anti-rotation tab 50.

Figure 20 shows a perspective view of the anchor shown in Figure 18, including a portion of a support member 100 positioned in the anchor 10. Figure 20 generally illustrates the position of the support member 10 when the support member 100 is received in the cylindrical cavity (20 in Figure 18) of the anchor. Figure 21 shows a side view of the anchor 10 and the support member 100 shown in Figure 20.

Figure 22 shows a top view of the anchor 10 and support member 100 shown in Figures 20 and 22. As shown in Figure 22, the support member 100 fits snugly in the anchor 10.

Figure 23 shows a cross-section of the anchor 10 and support member 100 shown in Figure 22, taken along the line 23-23'. In the example of Figure 23, a hole 51 in the anti-rotation tab 50 receives a grounding screw (5 in Figure 18). In the particular example of Figure 23, the bottom plate 52 is substantially circular and does not extend beyond the side walls of the body 1. In the particular embodiment of Figure 23, the support member 100 is spaced apart from the body 1 and the bottom plate 52 of the anchor 10. The walls of the body 1 include spacers 54, 55 that are wider portions of the

body 1, having smaller inside diameters than the rest of the body 1, thereby creating spaces between the support member 100 and the walls of the body 1. Also, the body includes a spacer 53 that contacts the received support member 100 near the bottom of the body. In the example of Figure 23, the spacer 53 is a chamfered bottom corner formed at the lower corners of the body 1, where the lower portion 11 of the body 1 meets the bottom plate 52. The chamfered bottom corner forms a centering cone that spaces the lower end 101 of the support member 100 from the bottom plate 52 and from the side walls of the lower potion 11 of the body 1. In so doing, the spacer 53 (the centering cone in this example) provides added stability to the support member 100.

Figure 24 shows a more detailed view of the chamfered bottom corner 53 shown in Figure 23. In the particular embodiment of Figure 24, the spacer 53 forms a 45-degree angle relative to the bottom plate 52 and the lower portion 11 of the body 1. The lower end 101 of the support member 100 contacts the spacer 53 in the example of Figure 24.

Figure 25 shows a more detailed view of one of the spacers 54 that extends into the cylindrical cavity (20 in Figure 18) and abuts the support member 100. In one embodiment, edges of the spacer 54 taper at a 30-degree angle.

Figure 26 shows a bottom view of a key 200 used to rotate the wedge portion 2 relative to the body 1 of the anchor 10. The key 200 includes a handle 202 and an engagement portion 204 connected to the handle 202. The engagement portion 204 includes two curved, extended members 216. Three pins 220 are connected at the engagement portion 204. In use, the pins 220 engage respective holes 22 of the wedge portion 2. The curved, extended members 216 allow the pins 220 of the key 200 to

engage the holes 22, by wrapping around the support member (100 in Figure 20) in a semicircle shape.

The handle 202 in the example of Figure 26 is bent in the embodiment of Figure 26. The handle 202 includes a first flat portion 210, a second flat portion 212 that forms a 30-degree angle with respect to the first flat portion 210, and a third flat portion 214 parallel to the first flat portion 212. This provides the user more room to maneuver the key 200.

Figure 27 shows a side view of the key 200 shown in Figure 26. As shown, the pins 220 extend outward from the curved, extension portions 216 and engage the holes 22 of the wedge portion 2. The first flat portion 210 is spaced from the third flat portion 214 by a distance EE. In one embodiment, the distance EE is in the range of 1.25-2.00 inches. In one particular embodiment, the distance EE is 1.59 inches. The length of the handle 202 is shown by the distances FF, GG, and HH. In one embodiment, the distance FF is approximately 4.75 inches, the distance GG is approximately 2.75 inches, and the distance GG is approximately 3.5 inches.

In use, the key 200 is used to exert a torque on the wedge portion 30, thereby turning the wedge portion 30 relative to the body 20. The pins 220 on the key 200 engage the holes 22 on the upper surface 21 of the wedge portion 30. The user then turns the handle 202 to exert a torque on the wedge portion 30.

To engage a support member 100 in the anchor 10, the wedge portion 30 is fitted loosely into the threads of the body 1. The support member 100 is inserted though the cavity 25 of the wedge portion 30 and into the cavity 20 of the body 1. The lower end 101 of the support member 100 contacts the spacer 53 at the bottom 11 of the body 1.

The key 200 then engages the wedge portion 30 using the pins 220 and holes 22. The key 200 turns the wedge portion 30 relative to the body 1 in a first direction (e.g., clockwise), thereby tightening the compression ring 3 around the support member 100. When the wedge portion 30 is tightened into place, the upper surface 21 of the wedge portion 30 is substantially flush with the upper surface 9 of the body 1 of the anchor 10.

To remove the support member 100 from the anchor 10, the key 200 engages the holes 22 in the wedge portion 30 and turns the wedge portion 30 in a second direction (e.g., counterclockwise) relative to the body 1. This loosens the compression ring 3, thereby releasing the support member 100 so that the support member 100 may be removed from the anchor 10.

Although the present invention has been described with respect to particular embodiments thereof, variations are possible. The present invention may be embodied in specific forms without departing from the essential spirit or attributes thereof. It is desired that the embodiments described herein be considered in all respects illustrative and not restrictive and that reference be made to the appended claims and their equivalents for determining the scope of the invention.